EURORACK MX1804X

User's Manual

Bedienungsanleitung

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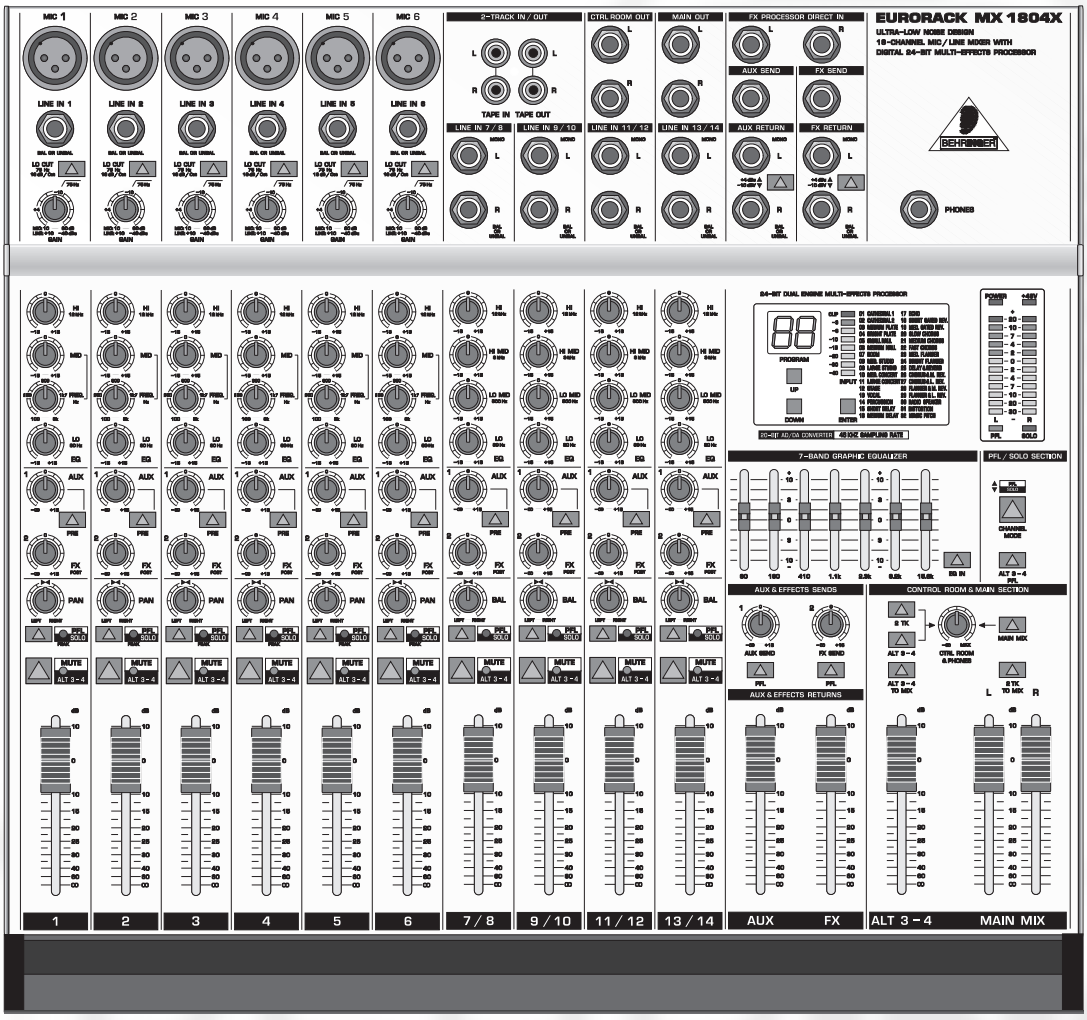
Version 1.1 March 2000



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We, **BEHRINGER INTERNATIONAL GmbH**

Hanns-Martin-Schleyer-Straße 36-38

D - 47877 Willich

Name and address of the manufacturer or the introducer of the product on the market who is established in the EC

herewith take the sole responsibility to confirm that the product:

EURORACK MX1804X

Type designation and article-Nº (if applicable)

to which this declaration refers, is in accordance with the following standards or standardized documents:

☒	**EN 60065**	☒	**EN 61000-3-2**
☒	**EN 55020**	☒	**EN 61000-3-3**
☒	**EN 55013**	☒	**EN 55022**

The following operation conditions and installation arrangements have to be presumed:

acc. to Operating Manual

BEHRINGER
INTERNATIONAL GmbH
Hanns-Martin-Schleyer-Str. 36-38
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B. Nier, President — Willich, 01.12.1998

Name, address, date and legally binding signature of the person responsible

SAFETY INSTRUCTIONS

CAUTION: To reduce the risk of electrical shock, do not remove the cover (or back). No user serviceable parts inside; refer servicing to qualified personnel.

WARNING: To reduce the risk of fire or electrical shock, do not expose this appliance to rain or moisture.

This symbol, wherever it appears, alerts you to the presence of uninsulated dangerous voltage inside the enclosure - voltage that may be sufficient to constitute a risk of shock.

This symbol, wherever it appears, alerts you to important operating and maintenance instructions in the accompanying literature. Read the manual.

DETAILED SAFETY INSTRUCTIONS:
All the safety and operation instructions should be read before the appliance is operated.
Retain Instructions:
The safety and operating instructions should be retained for future reference.
Heed Warnings:
All warnings on the appliance and in the operating instructions should be adhered to.
Follow instructions:
All operation and user instructions should be followed.
Water and Moisture:
The appliance should not be used near water (e.g. near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool etc.).
Ventilation:
The appliance should be situated so that its location or position does not interfere with its proper ventilation. For example, the appliance should not be situated on a bed, sofa rug, or similar surface that may block the ventilation openings, or placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.
Heat:
The appliance should be situated away from heat sources such as radiators, heat registers, stoves, or other appliance (including amplifiers) that produce heat.
Power Source:
The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.
Grounding or Polarization:
Precautions should be taken so that the grounding or polarization means of an appliance is not defeated.
Power-Cord Protection:
Power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords and plugs, convenience receptacles and the point where they exit from the appliance.
Cleaning:
The appliance should be cleaned only as recommended by the manufacturer.
Non-use Periods:
The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.
Object and Liquid Entry:
Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.
Damage Requiring Service:
The appliance should be serviced by qualified service personnel when:
- The power supply cord or the plug has been damaged; or
- Objects have fallen, or liquid has been spilled into the appliance; or
- The appliance has been exposed to rain; or
- The appliance does not appear to operate normally or exhibits a marked change in performance; or
- The appliance has been dropped, or the enclosure damaged.

Servicing:
The user should not attempt to service the appliance beyond that is described in the Operating Instructions. All other servicing should be referred to qualified service personnel.

MX1804X

Ultra-low noise 18-Channel 4-Bus Mixer with integrated VIRTUALIZER Multi-Effects Processor.

- ▲ 6 Mono Input Channels with gold plated XLRs, balanced Line Inputs and Inserts.
- ▲ Ultra-low noise discrete Mic Preamps with +48 V Phantom Power.
- ▲ 4 Stereo Input Channels with balanced TRS Jacks.
- ▲ 2 additional multi-functional Stereo Channels with 60 mm faders.
- ▲ 24-bit Stereo Multi-Effects Processor with ultra-high resolution 24-bit AD/DA converters, for internal AND external use.
- ▲ 32 original VIRTUALIZER Presets including 16 different Reverbs, Delays, Chorus, Flanger, Pitch Shifter, Speaker Simulation and various combinations.
- ▲ Switchable 7-band Graphic Equalizer for ultimate Main Mix equalization.
- ▲ ALT 3-4 bus routable to Main Mix and Control Room with Insert, PFL and 60 mm Masterfader.
- ▲ Extremely high headroom – offering more dynamic range.
- ▲ Balanced Inputs and Main Outputs for highest signal integrity.
- ▲ Ultra-musical 4-band EQ (Stereo Channels) and 3-band EQ with sweepable mid band (Mono Channels).
- ▲ Peak LEDs and switchable Low-Cut Filter on all Mono Channels.
- ▲ 2 Aux Sends (Aux 1 pre/post) per channel, for internal or external effects and monitoring.
- ▲ Master Aux Sends with Gain Control and PFL.
- ▲ Mute/ALT 3-4, Solo-In-Place and Pre-Fader-Listen function on all channels.
- ▲ Separate Main Mix, ALT 3-4, Control Room and Headphone Outputs.
- ▲ 2-Track Inputs assignable to Main Mix or Control Room/Headphone Outputs.
- ▲ Highly accurate 12-segment Bargraph Meters.
- ▲ High quality 60 mm Panasonic faders and sealed potentiometers.
- ▲ Rugged design Power Supply ensures superior transient response.
- ▲ State-of-the-art 4580 ICs and high quality components ensure crystal-clear audio performance.
- ▲ Extremely rugged construction ensures long life even under the most demanding conditions.
- ▲ Manufactured under the Management System ISO9000.

EURORACK

FOREWORD

Dear Customer,

Welcome to the team of EURORACK users and thank you very much for expressing your confidence in BEHRINGER products by purchasing this unit.

It is one of my most pleasant tasks to write this letter to you, because it is the culmination of many months of hard work delivered by our engineering team to reach a very ambitious goal: To produce a compact mixer, which fully satisfies your and our expectations and delivers a superior sound quality, easy operation and technical specifications. In addition to that the mixer is affordable for almost every musician. The task to design the EURORACK certainly meant a great deal of responsibility, which we assumed by focosing on you, the discerning user and musician. It also meant a lot of work and night shifts to accomplish this goal. But it was fun, too. Developing a product usually brings a lot of people together, and what a great feeling it is when everybody who participated in such a project can be proud of what we've achieved.

It is our philosophy to share our joy with you, because you are the most important member of the BEHRINGER family. With your highly competent suggestions for new products you've greatly contributed to shaping our company and making it successful. In return, we guarantee you uncompromising quality (manufactured under ISO9000 certified management system) as well as excellent technical and audio properties at an extremely favorable price. All of this will enable you to fully unfold your creativity without being hampered by budget constraints.

We are often asked how we can make it to produce such high-grade devices at such unbelievably low prices. The answer is quite simple: it's you, our customers! Many satisfied customers means large sales volumes enabling us to get better conditions of purchase for components, etc. Isn't it only fair to pass this benefit back to you? Because we know that your success is our success, too!

I would like to thank the following people, whose help on "Project EURORACK MX1804X" has made it all possible:

- ▲ The existing users of BEHRINGER equipment (whose comments and suggestions have made them the most important members of the BEHRINGER design team),
- ▲ Thorsten Derks (for this marvellous manual layout),
- ▲ Bernhard (Rammi) Ramroth (whose technical ingenuity is unique),
- ▲ C.W. for the fine mechanics (key-phrase "Tooling modification"),
- ▲ and all the others, who have made very personal contributions.

My friends, it's been worth the trouble!

Thank you very much,

Uli Behringer

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1. INTRODUCTION

Congratulations. In purchasing our EURORACK MX1804X you have acquired a mixer whose small size belies its incredible versatility and audio performance. Your EURORACK is built to the same outstanding quality as our top-of-the range console, the BEHRINGER EURODESK MX9000.

One of the outstanding features of the MX1804X is its integrated, digital 24-bit Effects Processor. We developed an extremely compact module that provides the highly acclaimed VIRTUALIZER sound using the same algorithms, 24-bit AD/DA converters, a 24-bit DSP and 46 kHz sampling rate. This means that 32 presets with first-class Room Simulations, Delay and Modulation Effects are at your disposal. Moreover the MX1804X possesses an additional Alt 3-4 bus, a 7-band Graphic Equalizer and a choice of routing options which facilitate the work with your MX1804X.

Later we will see how adding the BEHRINGER ULTRALINK PRO MX882 to your system can inexpensively expand the capacity and flexibility of you mixing power even further. First of all, however, we want to take you on a guided tour of your new rack-mounted console – the BEHRINGER EURORACK MX1804X.

We recommend that you experiment with your EURORACK away from the pressures of a recording session or live concert, in order to get a feel for it. It is a musical instrument. Learn to play it well.

Most specialist subjects are not really all that difficult provided you understand the language used, and the vocabulary of mixing is pretty straightforward. Nevertheless it is as well to be clear about what certain terms mean. A “slot” in a recorder will always be referred to as a track, while that in a mixer will invariably be a channel. I will attempt to be as unambiguous as possible with terms, since much confusion can arise from sloppy definitions. If a new term (to you) does arise, and it isn’t fully explained in the text, try to look it up in the glossary before you write a letter of complaint!

In the appendix you will find one page with drawings showing the front and rear panel of your EURORACK respectively. Keep them turned over, lying to the left of the text pages, while studying the manual.

All functions will be numbered consistently throughout the manual, whether they be in the text or on an illustration. Note that some functions are exactly the same for both mono and stereo channels (e.g. the Aux Sends). In this case only the mono channel´s functions are numbered.

1.1 Concept

The configuration of the MX1804X is “18 into 4 (2+2) into 2”. There are six mono channels, four stereo channels and two additional stereo line inputs (Aux and FX Return). In addition there is a 2-Track input routable to the Main Mix. Every channel is always routed to the Main Mix unless the ALT 3-4 switch [15] is pushed. In this case the signal is sent to the Alt 3-4 bus instead. Alt 3-4 may be blended with the Main Mix at the Control Room output via a switch. In addition to that the Alt 3-4 signal can be integrated in the Main Mix when you press the ALT 3-4 TO MIX switch [45].

1.1.1 Architecture

Mono input channels
The channels 1 to 4 are mono, with a choice of balanced Mic or Line inputs. The vintage-style high-current discrete Mic amps are of the same incredible quality as those found on the acclaimed BEHRINGER EURODESK MX9000, while a large external Power Supply ensures low noise and superior transient response at all times. Due to the inserts the mono channels offer a similar functionality as “big” consoles. The insert points double up as direct outputs when wired to a normalized pair of in/out sockets on a standard patchbay (see chapter 4.3 “Patchbay”).

Stereo input channels
A further 8 Line inputs on the MX1804X are configured as 4 balanced stereo input channels. These are ideal for multitrack Tape Returns, or for accepting outputs from MIDI and other electronic instruments.

Channel outputs
A high-quality true-logarithmic 60 mm fader feeds the Main Mix or Alt 3-4 bus via the channel Pan.

Aux/FX Sends
There are two Aux Send buses on the MX1804X. The second one is called FX Send and leads to the internal Multi-Effects Processor. But you can also use the FX Send for external effects devices.

Stereo Aux/FX Returns (additional stereo line inputs)
The MX1804X features two balanced Aux Returns. These inputs are perfectly suited for Effect Returns and Tape Returns from multitrack machines. The Aux Returns may also be used for mixing in extra MIDI instruments etc. The second return usually serves for the internal Effects Device. But you can also use it as additional line input.

Main Mix output
The Main Mix output level is controlled via a pair of high-quality true-log 60 mm stereo faders and is monitored by a pair of accurate 12 segment bargraph peak meters, surrounded by 4 status LEDs.

24-bit digital Effects Processor
The integrated 24-bit digital Effects Processor offers first-class algorithms, which are also used in our VIRTUALIZER. The Effects Device features all standard effects (Reverb, Chorus, Flanger, Delay, etc.) and – due to its excellent quality – it can be used for mix down situations and live applications as well.

7-band Graphic Equalizer
As a special feature the MX1804X owns a 7-band Graphic Equalizer. The equalizer allows for quickly providing the finishing touch to your overall sound in live performances or mix down.

Additionally, your MX1804X provides an adjustable headphones output, a separate 2-Track in-/output and the above mentioned Alt 3-4 output. There are inserts for the mono channels, the Alt 3-4 and the Main Mix bus.

1.2 Before you begin

1.2.1 Metering

The channels 1 to 6 have peak LEDs, while the L and R outputs have 12 segment bargraph meters. The L/R meters double up as mono PFL or stereo solo meters.

The meters should average around 0 dB during loud passages. If they read persistently higher, or are peaking above +10 dB, reduce either the main L/R faders and/or channel faders, or (as a last resort) channel input gain. Maybe it's time to do a round of PFL metering.

1.2.2 PSU (Power Supply Unit)

Any amplifier circuit is limited in its transient response by the available current. Every mixer has numerous line level operational amplifiers (op-amps) inside. When being driven hard, many desks begin to show signs of stress due to Power Supply limitations. Not so with the EURORACK MX1804X. The sound will always stay clean and crisp right up to the operating limits of the op-amps themselves, thanks to our generous 40 W external Power Supply Unit.

Please connect the PSU with the EURORACK MX1804X PSU connector 66 on the rear panel of your mixer and switch on your MX1804X with the Power switch 63.

☞ **Do not connect the PSU to the EURORACK while the PSU is connected to the mains supply. Connect switched-off desk and PSU first before you connect the PSU to the mains supply. Lastly switch on desk.**

1.2.3 Warranty

Please take time to have the Warranty Card filled out completely by your specialized dealer and return it within 14 days after the date of purchase, so as to be entitled to benefit from our extended warranty. You will find the Serial Number 65 of your MX1804X on the rear panel.

1.2.4 Packing

Your BEHRINGER EURORACK was carefully packed in the factory and the packaging was designed to protect the unit from rough handling. Nevertheless, we recommend that you carefully examine the packaging and its contents for any signs of physical damage, which may have occurred in transit.

☞ **If the unit is damaged, please do not return it to us, but notify your dealer and the shipping company immediately, otherwise claims for damage or replacement may not be granted.**

Shipping claims must be made by the consignee.

1.2.4 Rack mounting the MX1804X

Enclosed in the shipping box you will find a rackmount kit. If you want to make your MX1804X a rack mixer, loosen the screws from the side panels and use them to fix the rack ears (note, that there is a left and a right one).

☞ **Be sure that there is enough space around the unit for cooling and please do not place the MX1804X on high temperature devices such as power amplifiers etc. to avoid overheating.**

☞ **When switched on, parts of the desk and the Power Supply Unit will become very warm, which is normal during operation.**

2. OPERATION

2.1 Mono input channel

Each channel comes with a balanced Line input on 1/4" jack [2], and an XLR Mic input [1]. Phantom Powering is switchable from the rear panel with switch [64]. The Gain circuit [4] has an unusually wide range, obviating the need for Mic/Line switching. The crucial operating levels +4 dBu and -10 dBV are clearly and accurately legended.

☞ **When using the Mic input please make sure nothing is connected to the same channel's Line input, and vice versa.**

2.1.1 Input level setting

Channel input level is determined by the Gain control [4]. Use the Solo/PFL switch [13] to bring the channel input onto the left and right bargraph meters [35] respectively. This also sends the solo/PFL-ed signal to the left and right speakers.

For level-setting (as opposed to localized listening) choose to use the mono PFL bus rather than the post-fader (post-channel Pan) stereo solo bus (Channel Mode global switch [38] UP).

Solo/PFL never interrupts the mix at the main recording outputs. It follows that Aux Sends must also be unaffected, since they contribute directly to the Main Mix.

In addition to switchable Solo/PFL metering [35], a channel LED [14] illuminates when a channel is going into overload. You do not want the peak light to come on except very intermittently during a take or a mix. If it does light persistently, reduce input gain.

There is a steep Lo Cut filter [3], slope at 18 dB/oct., -3 dB at 75 Hz, for reducing floor rumble, explosives, woolly bottom end, etc.

2.1.2 Equalizer

All mono input channels are fitted with three-band EQ and the above mentioned switchable Lo Cut filter for eliminating unwanted subsonics. All three bands have up to 15 dB of cut and boost, with a centre detent for off.

The upper [5] and lower [8] shelving controls have their frequencies fixed at 12 kHz and 80 Hz respectively. On the MX1804X, the midrange control [6] is semi-parametric with a peaking response, Q fixed at 1 octave, sweepable from 100 Hz to 8 kHz [7].

2.1.3 Aux Sends

Both Aux Sends are mono and post-EQ. Aux Send 1 [9] can be taken from a point before or after the channel fader, i.e. pre or post by switch [10]. Aux Send 2 [11] is always wired post-fader. You can use the 1/4" jack [54] to receive the signal of Aux Send 1. The control of Aux 2, which is called FX, you can send signals from all channels to the internal Effects Processor. Of course, you can use the Aux Send 2 also to

head for external Effects Devices. For that you can use the FX Send 56 and the FX Return jack 60 on the top of the mixer. As a result the internal Effects Processor is no longer provided with an input signal.

For almost all effects send purposes, you will want Aux Sends to be post-fader, so that when a fader level is adjusted, any reverb send from that channel follows the fader. Otherwise, when the fader is pulled down, the reverb from that channel would still be audible. For cueing purposes, Aux Sends will usually be set pre-fader, i.e. independent of the channel fader and mute.

Most reverbs etc. sum internally the left and right inputs. The very few that don't may be driven in true stereo by using 2 Aux Sends.

There is +15 dB of gain on every Aux Send. Such a high boost is usually only appropriate where the channel fader is set around -15 dB or lower. Here, an almost exclusively wet signal will be heard. In most consoles, such a wet mix required the use of a pre-setting for the channel Aux Send, losing fader control. With the EURORACK you can have a virtually wet mix with fader control.

2.1.4 Routing, fading and muting

Level to the Main Mix and Alt 3-4 buses is ultimately determined by the channel faders 17. These are specially manufactured for BEHRINGER mixing consoles, and are designed to give a smooth logarithmic taper of a type more usually associated with megabuck consoles. The low level performance particularly is far smoother than that of a normal budget fader.

Channel Pan 12 positions the output of the channel in the stereo field. Its constant-power design ensures there are no level discrepancies whether a signal is hard-panned, centre-stage, or somewhere in-between. Such pin-point accuracy will be a revelation if you have been working on consoles with lower quality circuits.

Solo/PFL we encountered in section 2.1.1. Solo also follows channel Pan.

The Mute/Alt 3-4 button 15 is ergonomically placed immediately above the channel fader. Engaging mute, indicated by 16, is equivalent to setting a fader level of minus infinity.

On the MX1804X the button 15 serves two functions. When mixing directly to stereo, it acts as a normal mute. However, this button also acts as a routing button to the Alt 3-4 outputs. In other words, you select between the Main Mix and Alt 3-4 stereo buses via switch 15.

This is very useful when submixing live or recording to multitrack, as we shall see later (see chapter 4 "APPLICATIONS").

2.2 Stereo input channel

Each stereo channel comes with two balanced Line level inputs on 1/4" TRS jacks 57, for left and right signals. When only the left input is connected, the channel operates in mono.

2.2.1 Input level

The stereo channels of the MX1804X are designed for typical Line level signals. With the help of the PFL function you can control the level of the input signal in the stereo channels. If it is necessary you can adapt the output level of the connected device (MIDI instruments, Effects Devices, etc.) via its output level control.

2.2.2 Equalizer

The stereo input channels are fitted with four-band EQ.

The upper 5, high midrange 18, low midrange 19 and lower 8 shelving controls have their frequencies fixed at 12 kHz, 3 kHz, 500 Hz and 80 Hz respectively.

All bands have up to 15 dB of cut and boost, with a centre detent for off.

A stereo Equalizer is generally preferable to using two mono Equalizers when EQ-ing a stereo signal, as often discrepancies between left and right settings can occur.

2.2.3 Aux Sends

These are the same as for mono channels (see 2.1.3). Note that a mono sum is taken from the stereo input.

2.2.4 Routing

The only difference here from the mono channel described is in the implementation of the Balance control 20.

When a channel is run in stereo, this control functions as a Balance control, determining the relative balance of the left and right channel signals being sent to the left and right Main Mix buses (or Alt 3-4). For example, with the Balance control turned fully clockwise, only the right portion of the channel's stereo signal will be routed to the Main Mix.

Balance also determines the relative amount of left and right channel signals being sent to buses 3 and 4 respectively when switch MUTE/ALT 3-4 is engaged.

When you push the Solo/PFL button the Solo/PFL control LED 21 will light up.

2.3 Inserting

Insert points are useful for adding dynamic processing or equalization to a channel or the mix. Unlike Reverbs etc., which are usually added to the dry signal, dynamic processing is normally applied across an entire signal. Here an Aux Send would be inappropriate. Instead the signal is intercepted somewhere along the channel, fed through the dynamics processor and/or EQ, then returned to the console at the same point where it left. The insert point is normalized, i.e. the signal is only interrupted when a jack is plugged into it (see chapter 4.3 "Patchbay").

2.3.1 Mono channels

All mono input channels have got insert points. Each insert point is accommodated on a single TRS jack socket 73 wired tip = send, ring = return, sleeve = ground/ screen. Inserts are always pre-fader, and also pre-EQ and pre-Aux Sends.

Insert Points may also be used as pre-EQ direct outputs without interrupting the signal flow. Note that if you are using the EURORACK insert as a Direct Output, and you want to maintain the signal flow down the channel, you should use a TRS jack with tip and ring connected. Note that this is not the same as for unbalancing a balanced lead, where the ring and sleeve would be connected (see chapter 6 "INSTALLATION").

You can extend the functionality of your insert points by wiring them onto a jackfield patchbay, where send and seturn can be accessed on separate sockets (see chapter 4.3).

2.3.2 Stereo channels

If you want to insert a dynamics processor etc. into a stereo input channel or one of the other stereo Line inputs, it must be done between the source output and the EURORACK input, as these channels have no bona-fide insert point.

2.3.3 Main Mix

For the Main Mix there are two insert jacks 70 on the rear panel.

2.3.4 Alt 3-4

On the rear panel of your MX1804X you can also find insert jacks 72 for the Alt 3-4 bus.

2.4 Main section

2.4.1 Aux Sends

Master Aux Send levels are determined by 30 and 29. These controls have a centre detent indicating unity gain. Don't worry if your effects unit has no input Gain control – you have a further +15 dB available from these outputs. The PFL buttons 31 and 32 offer you the possibility to control the signals routed to the Aux busses via the Control Room output 52.

2.4.2 Additional stereo Line inputs

There are two additional stereo Line inputs (Aux Return 58 and FX Return 60) on your MX1804X. Aux Return 1 operates in mono if only the left channel socket has a jack connected.

Level can be adjusted by the faders 46 and 47. The returns are permanently assigned to the Main Mix. The Aux Return 2 (FX Return) is usually reserved for the internal Effects Processor. But you can also use the FX Return input jacks 60 to return signals from external devices. As a result you can also use FX Return as an additional stereo Line input.

The Aux Returns have been cleverly designed to be multifunctional. They may be used for returning the outputs of effect units. You can use them as Tape Returns from a multitrack recorder. They may also be used as extra instrument inputs, especially if your MIDI keyboard or rack supplies a pre-mixed stereo signal.

Certain stereo effects produce a perceived imbalance between the left and right channel levels. To correct for this you will have to bring your stereo effect back on a stereo channel, which has a Balance control.

Via the switches 59 and 61 you can choose between the two different operating level settings -10 dBV and +4 dBu.

2.4.3 Metering

Main Mix/Solo/PFL level is displayed on a pair of highly-accurate 12 segment bargraph peak meters 35. Four additional LEDs indicate power on 33, +48 V Phantom Power present 34, and whether the mono pre-fader-listen bus 37 or the stereo solo bus 36 is engaged.

2.4.4 Channel Mode

The CHANNEL MODE switch 38 determines whether Solo-In-Place or Pre-Fader-Listen is assigned to the channel solo buttons.

Solo
Solo is the preferred method for auditioning an isolated signal, or group of signals. Whenever a solo button is pressed, all unselected channels are muted in the monitors. Stereo panning is maintained. The solo bus is derived from the output of the channel Pans, Aux Sends and stereo Line inputs. It is always post-fader.

PFL
Pressing 38 once disengages the stereo Solo bus, and replaces it with a separate mono PFL (Pre-Fader-Listen) bus. Now any channel which is solo-ed, isn't. It is PFL-ed instead. PFL should always be used for Gain setting (see also chapter 3 "PRACTICE").

2.4.5 2-Track input and output

Input
A 2-Track input, on RCA phono jacks 50, provides easy connection to DAT and other semi-professional audio equipment.

The 2-Track input is primarily for auditioning mix playback from tape. Switch 40 2 TK TO CONTROL ROOM routes this signal to the monitors and/or phones.

However, it can also be routed to the Main Mix via button 44 2 TK TO MIX and will act as an additional input for tape playback, MIDI instruments etc. Here switch 40 should be disengaged, or you will be listening to the 2-Track signal twice over!

With 44 depressed you have another stereo Line input available to the mix, useful e.g. for adding the output of a second EURORACK or a BEHRINGER ULTRALINK PRO to your mix (see chapter 4.4 "Expanding").

Output
The Main Mix output is delivered by XLR connectors 67 and TRS jacks 53 and 69 on the front and back panel as well as by RCA phono jacks on the front.

Level is ultimately determined by a pair of precision faders 49.

☞ **If you connect a Compressor or a Noise Gate to the 2-Track outputs smooth fades are no longer possible.**

Although the 2-Track output is primarily designed for recording, it can also be used as a PA feed, or as a

send to the input of your sampler. Depressing [68] on the rear panel will lower the level at the XLR connectors by 20 dB.

2.4.6 Monitor section

Though most of you will want to audition the Main Mix [42] most of the time there are exceptions. These include the Alt 3-4 bus [43] and 2-Track playback [40].

A single volume control [41] sends the level to the headphones and main monitors. The bargraph meter [35] shows the level of the chosen signal. You can connect your headphones to the headphones connector [62] on the front panel.

The output signal of the Main Mix remains untouched when you choose different sources for monitoring.

If you want to audition external sources very often, you could do worse than connect your 2-Track input to a hi-fi pre-amp, allowing you to monitor a variety of extra sources such as vinyl, cassette, CD etc.

2.4.7 Alt 3-4 output

By depressing the MUTE button [15] a channel's output will be routed to the Alt 3-4 output instead of the Main Mix.

Level to the Alt 3-4 outputs (TRS jacks on the back panel) is adjusted by the fader [48]. Use [43] to have the signal PFL-ed ([40] and [42] up).

Alt 3-4 is likely to bewilder newcomers. We want to illustrate how this feature may be used most effectively.

Subgroups are commonly used as a mixing aid both live and in the studio, e.g. to combine the outputs from all drum channels onto just 1 or 2 submaster faders. They are also used to route to multitrack recorders.

There are no fully-fledged Subgroups on the MX1804X. However, the Alt 3-4 bus offers you a second independent stereo submix with its own submaster stereo fader. Combining the Alt 3-4 outputs with the Main Mix may be effected by pressing the switch ALT 3-4 TO MIX [45]. To take advantage of the extra routing option you should use the possibility to send signals to the Alt 3-4 outputs [71].

By depressing the ALT 3-4 PFL switch [39] you can control the Alt 3-4 signal separately.

☞ **Remember that when Alt 3-4 is in use, you do not have a channel mute facility on your desk: you will have to pull down the fader to silence any channel.**

2.4.8 Graphic Equalizer

The Graphic Equalizer [28] processes the Main Mix signal. This way you can adapt the Main Mix signal to the room acoustics or your personal taste. Each individual frequency band has up to 10 dB boost or cut. You can engage the Equalizer with the EQ IN switch [27], this is indicated by the illumination of the faders.

2.4.9 Digital Effects Processor

A special feature of the MX1804X is its integrated Effects Processor, which supplies the same quality, as our well-known 19" Effects Processor VIRTUALIZER. This Effects Module offers 32 different standard effects like Reverb, Chorus, Flanger, Delay, Pitch Shifter and various combination effects. With the FX Sends [32] in each channels in combination with the FX Master Send [29] you can feed the signal to the Effects Processor. Make sure that the LED level display [22] on the Effects Module always displays a sufficiently high level, without the CLIP LED lighting up. With the two UP [25] and DOWN [26] buttons you can choose the desired preset. The rate of change can be accelerated by pressing the opposite button while holding down the first. In order to activate the selected preset, you press the ENTER button [24]. The display [23] shows the activated preset number. You can choose the appropriate preset from the list to the right of the level display of the Effects Module. By using the FX PROCESSOR DIRECT IN inputs [55], you can also connect an external signal directly with the Effect Processor.

No.	Preset name	No.	Preset name
1	Cathedral 1	17	Echo
2	Cathedral 2	18	Short Gated Reverb
3	Medium Plate	19	Medium Gated Reverb
4	Bright Plate	20	Slow Chorus
5	Small Hall	21	Medium Chorus
6	Medium Hall	22	Fast Chorus
7	Room	23	Medium Flanger
8	Medium Studio	24	Bright Flanger
9	Large Studio	25	Delay & Reverb
10	Medium Concert	26	Chorus & Medium Reverb
11	Large Concert	27	Chorus & Large Reverb
12	Stage	28	Flanger & Medium Reverb
13	Vocal	29	Flanger & Large Reverb
14	Percussion	30	Radio Speaker
15	Short Delay	31	Distortion
16	Medium Delay	32	Magic Pitch

Tab. 2.1: Presets of the internal effects processor

Cathedral: Reverb program that generates long and dense reverberation, much like the natural Reverb ambience found in churches or cathedrals. Particularly suitable for solo instruments and voices.

Plate: The sound of early Reverb plates. A classic Reverb program for drums and solo voices.

Hall: Simulation of a small, highly reverberating hall. Use short Reverb times (**Small Hall**) to process drum instruments or medium Reverb times (**Medium Hall**) to enhance wind instruments.

Room: You can clearly hear the walls of this room as they are reflecting the sound. A useful program for Reverb that isn't directly noticable (rap, hip hop vocals) or to make dry recordings of instruments sound natural again. Very all-round effect.

Studio: Middle to large rooms. Creates a natural and multipurpose sound.

Concert: You can choose between a small theater (**Medium Concert**) or large concert hall (**Large Concert**).

Stage: Wonderful Reverb, for example, to provide keyboard pads or acoustic guitars with width and depth. Designed for live applications and mixdown.

Vocal: Rich and dense Reverb with middle Reverb times giving solo voices their finishing touch.

Percussion: This dense Reverb is characterized by pronounced early reflections which make it very suitable for dynamic signals (drums, percussion, slap bass, etc.).

Delay: Here, the input signal is delayed with several feedbacks.

Echo: Much like the Delay effect, echo repeats the input signal with decaying intensity. However, here the echoes lose brilliance with each repetition, which simulates the trendy "vintage" effect produced by tape echo units that were widely used in the pre-digital era.

Gated Reverb: Phil Collins' song "In the air tonight" made this effect famous: a Reverb is cut off abruptly after a certain time.

Flanger: An LFO constantly modulates the effect signal's pitch by a few cents up and down. Flanger effects are primarily used for guitars, but there are also lots of other useful applications: voices, cymbals, bass, remixes, etc.

Chorus: Though similar to the Flanger, Chorus uses a delay function instead of feedback. Combined with the pitch shifting feature, the delay produces a very pleasant detune effect. Chorus effects are used so often and in such a variety of applications that any recommendation would mean a limitation of their use.

Pitch Shifter: This effect transposes the input signal to create harmonies or simply to widen the sound of a single voice. The Pitch Shifter effect can also be used to produce a cartoon character type voice effect.

Delay & Reverb: Probably the most popular combination used for vocals, solo guitars, etc. This program uses a Bright Room Reverb which can be used for a variety of applications.

Chorus & Reverb: This algorithm combines the popular Chorus effect with the Reverb effect.

Flanger & Reverb: In this program the Flanger is combined with the Reverb effect.

Radio speaker: This effect simulates a radio speaker. As a result you can manipulate the sound of your music.

Distortion: A clearly up-to-date program for Lo-Fi effects applied to vocals or drum loops, combined with a Delay. As a little extra the distortion circuit also includes an LFO-controlled notch filter which audibly wanders back and forth with maximum distortion.

2.4.10 Talkback, communication with musicians in a studio

As there is no talkback mic in the EURORACK, you will have to use a mono (Mic) channel and a separate microphone, routed via the cue feeds to the artists headphones.

The cue feed would be normally taken from Aux Send 1, set to pre-fader. The BEHRINGER POWERPLAY PRO HA4400 headphone distribution amplifier provides up to four separate headphones mixes for performers.

3. PRACTICE

3.1 Selecting inputs

1) Mono channels accept Mic or Line inputs. If you are using the Mic input, make sure nothing is connected to the Line input (and vice-versa).

   The Mic inputs are more sensitive than the Line inputs. Do not connect mics with phantom power switched on.

2) Stereo channels accept -10 dBV or +4 dBu Line level signals. Any stereo channel can be run in mono simply by connecting into the left jack socket only. These channels are suitable for a variety of line-level sources including MIDI instruments and Tape Returns from multitrack.

3) Stereo Line inputs are primarily designed for returning effects units, though these too may be given over to multitrack returns or MIDI instrument outputs.

3.2 Initializing channels for gain setting

1) Set Gain to minimum and all Aux Sends to off (fully counterclockwise).

2) Set EQ to flat (all knobs at 12 o'clock).

3) Where applicable, set Lo Cut switch ON for most mics, OFF for signals with desired very low frequency content.

4) Set Channel Mode to PFL.

5) Depress Solo/PFL switch.

3.3 Auditioning a signal and setting up a channels

1) Make a typical noise, or roll the tape. There should also be some activity at the main L/R bargraph meters, indicating the PFL level.

2) For Mic/Line inputs: Adjust the Gain control until transient peaks are regularly hitting +6 dB. Continuous signals should not exceed 0 dB.

3) For stereo Line inputs: Adjust the source's output Gain until transients are regularly hitting +6 dB. Continuous signals should not exceed 0 dB.

4) If EQ is used, repeat steps 1) & 2).

5) If an insert is used to patch in a Compressor, Gate, EQ etc, use the outboard processor's bypass or effect off switch to A/B monitor the effect. If it does not have a bypass switch or equivalent, you will have to keep connecting and disconnecting the device until you complete the following procedure: Adjust the processor's output level so that effected and bypassed signals are of comparable level, i.e. Unity Gain.

6) Solo/PFL switch UP. Move onto next channel.

3.4 Desk normalization

All board settings should be set to the normal default condition before or after every session. Usually faders are set to zero (minus infinity) EQ's set flat and switched out, trimpots and channel Aux Sends turned fully counterclockwise etc. Many controls have a natural initial setting. For EQ cut and boost this is centre position. However, some settings, such as selecting pre or post for channel Aux Sends, will depend on the operating environment (e.g. studio or live), or on a particular engineer's preferred way of working.

3.5 Multitrack initialization

Set up the multitrack so that any track in "record ready" condition has its input monitored when the tape is stationary. Place all tracks to be recorded into "record ready" status. (Once a recording has been made, these tracks should automatically switch to tape playback.) Check that the input levels to each track are optimized before recording commences.

3.6 Recording levels

When recording to digital, it's a good idea to keep the recorder's peak meters below 0 dB. Most (not all, esp. samplers) read 0 dB with some headroom left. This is because, unlike with analog, the onset of digital distortion is as sudden as it is horrible. If you really want to take your recording level to the limit (and fully exploit 16-bit digital's 96 dB dynamic range), you'll have to do some calibrating. How to do it? Well, you could run a tone at 0 dB from the mixer and use that as your DAT or ADAT reference. But your DAT or ADAT may be way under its maximum input limit. Probably a better way to work out just how hard you can drive your recorder is to incrementally increase the record level until the onset of digital distortion, subtract, say, 5 or 10 dB, and never exceed that level. Engage "peak hold" on your recorder before recording if you want to confirm that you haven't.

When recording to analog, the tape machine's VU meters should show around +3 dB on bass, but only around -10 dB for hi hat. Although analog distortion is more like compression at modest overload levels (often desirable on bottom end), higher frequencies cause saturation even at modest levels (an unpleasant 'crunchiness'). Also, VU meters tend to progressively under-read above 1 kHz, due to their sluggish response time. Hi-hats should read about -10 dB on a VU meter, as against 0 dB for a typical snare drum, and +3 dB or more for a kick drum.

Peak meters read more-or-less independent of frequency. Aim for 0 dB recording level for all signals.

3.7 Track sheet

When laying out channels for recording or mixing, try to be sensible. Keep toms together, etc. Work out a scheme that suits you and stick to it. A common order is: kick drum, snare, hi-hat, toms (as the audience sees the kit), cymbals (ditto), bass, guitars, keyboards, other instruments, vocals. From session to session and gig to gig you will soon know where you are without hardly ever having to look at your tracksheet.

4. APPLICATIONS

4.1 Live gig with simultaneous 2-Track recording

Here some or all mono channels are likely to be tied up with stage mics. Carefully position these so as to minimize feedback. Try to keep the stage volume as low as possible, as stage sound can interfere with and muddy FOH sound, as well as causing a reduction in feedback thresholds. Don't forget to notch out trouble-some frequencies using a Graphic (e.g. our ULTRA-GRAPH GEQ3102) or Parametric Equalizer (e.g. our ULTRA-Q PRO PEQ2200), or our FEEDBACK DESTROYER DSP1100P.

Use the Lo Cut filters to eliminate floor rumble, mics popping etc.

Try using a Compressor and Noise Gate on vocals, bass, guitar and even drums via channel insert.

Input	Source	Routing	Mic/Line	Mono/Stereo
1	Vocals	Main Mix	Mic	Mono
2	Bass Drum	Alt 3-4	Mic	Mono
3	Snare Drum	Alt 3-4	Mic	Mono
4	Overhead L	Alt 3-4	Mic	Mono
5	Overhead R	Alt 3-4	Mic	Mono
6	Bass	Main Mix	Mic	Mono
7/8	Keyboard 1	Main Mix	Line	Stereo
9/10	Keyboard 2	Main Mix	Line	Stereo
11/12	Keyboard 3	Main Mix	Line	Stereo
13/14	Keyboard 4	Main Mix	Line	Stereo
Aux Return 1	Playback from MTR			Stereo
FX Return	Effects Return			Stereo

Tab. 4.1: Use of the inputs of your MX1804X

Output	Application
Alt 3-4	Drum Submix
Aux Send 1	Headphones (pre-fader)
FX Send	int. Effect (post-fader)
Main Mix	Recording DAT
Control Room out	Poweramp. (FOH mix)

Tab. 4.2: Use of the outputs of your MX1804X

4.2 MIDI project studio

8-track MIDI project studio with sampler, 8-track recording system, one vocal mic and two effects units:

With largely computer-generated music you will want to have plenty of Line inputs, and an ability to take vocals quickly, efficiently, and with minimal desk disturbance. Often a vocal line is added after the music is

almost complete. For this we try not to use a valuable Aux Send as a cue feed. In general, the mix in the artist's headphones can be the same as that going into the Control Room monitors: basically a stereo mix with 1) the vocal channel raised above the "mix" level in volume and 2) any off-putting channels muted.

If you intend to take several tracks in quick succession, you can route the channel via the Alt 3-4 bus simultaneously into all tape tracks via a simple Junction Box, Splitter Lead, Line Mixer like our ULTRALINK PRO MX882, or Patchbay, like our ULTRAPATCH PRO PX2000.

Note: When using Alt 3-4 to send to tape, you can either audition the signal via the tape recorder track, or by assigning Alt 3-4 to the Control Room monitors, or both. If you are auditioning the vocalist via both routes, the voice should appear louder to you (and the singer) during a take, but be set properly in the mix during playback. By a benign twist of fate, this is usually exactly want you (and they) want.

Input	Source	Routing	Mic/Line	Mono/Stereo
1	Vocals	Alt 3-4	Mic	Mono
2	Tape	Main Mix	Line	Mono
3	Tape	Main Mix	Line	Mono
4	Tape	Main Mix	Line	Mono
5	Tape	Main Mix	Line	Mono
6	Tape	Main Mix	Line	Mono
7/8	Sampler 1	Main Mix	Line	Stereo
9/10	Sampler 2	Main Mix	Line	Stereo
11/12	Sampler 2	Main Mix	Line	Stereo
13/14	Sampler 4	Main Mix	Line	Stereo
Aux Return 1	ext. Effect			Stereo
FX Return	int. Effect			Stereo

Tab. 4.3: Use of the inputs of your MX1804X

Input	Application
Recording (multitrack)	Alt 3-4
Aux Send 1	ext. Effect
FX Send	int. Effect
Main Mix	Recording (DAT)
Control Room out	Monitor Speaker

Tab. 4.4: Use of the outputs of your MX1804X

4.3 Patchbay

A Patchbay allows to patch the audio signals of most components in your studio from a central point and send them to other units, which makes your entire cabling better structured and is indispensable for professional work. If you want to use your studio as effectively as possible then it is preferable to use a complete Patchbay wiring scheme, but even less sophisticated patchbay solutions will benefit smaller studio configurations.

4.3.1 Patchbay configuration

The majority of commercially available Patchbays include two rows with 24 phone jacks each in a 19" 1 HU rack panel. On the rear, either a corresponding number of phone jacks or contacts for soldering signal leads can be found. Each group of four of these phone jacks forms one module. The configuration of some Patchbays can be changed by inserting jumpers or turning individual modules.

With the help of our ULTRAPATCH PRO PX2000, an easy-to-use 24-Patchbay offering phone jacks throughout, you can easily understand the four different modes. With the ULTRAPATCH PRO you can select between the four different operating modes simply by setting a switch on the upper panel (example: module 17):

4.3.2 Parallel

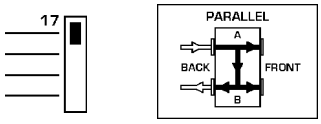

Fig. 4.1: Patchbay mode “parallel”

In this mode, all terminals of one module are interconnected. This configuration doesn’t make sense at first glance but is used to split up and send *one* audio signal (e.g. Aux Send) to several destinations (e.g. effects devices).

4.3.3 Half-normalled

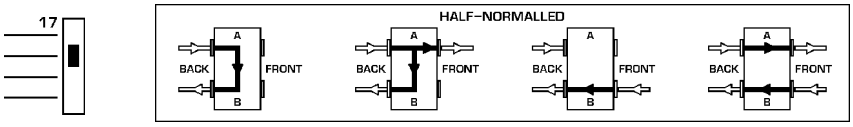

Fig. 4.2: Patchbay mode “half-normalled”

In this configuration, the contacts of the two jacks on the rear are interconnected. When you insert a plug into the upper front jack, the signal routed through the rear path is not interrupted. Only when the lower front jack is used will the rear panel route be split up, so that the two upper and the two lower phone jacks are connected to one another. This configuration is called “input break” and is used mainly for insert paths. So you can easily patch the signal from a mixing console channel at the Patchbay without interrupting the signal flow in the channel.

4.3.4 Normalled

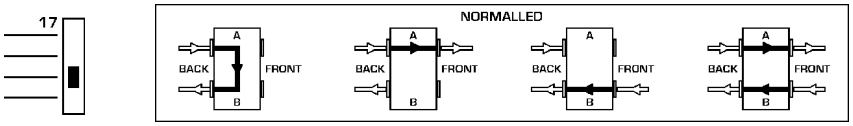

Fig. 4.3: Patchbay mode “normalled”

Here, and in contrast to the “half-normalled” setup, the signal route of the rear phone jacks is interrupted when you insert a plug both into the upper and lower front jacks.

4.3.5 Open

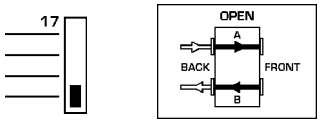

Fig. 4.4: Patchbay mode “open”

This mode is used to connect devices such as sound modules or CD players having no inputs of their own.

This saves space, as you can route the left and right outputs to one module (left - top; right - bottom) or patch two devices to one module (top and bottom). Effects devices and 2-Tracks can be configured this way, so the inputs and outputs are positioned on top of each other.

Basically, the inputs are routed to the bottom and the outputs to the top rear-wall connectors. Avoid routing digital signals over a Patchbay as the pulse signal used for the transmission of such signals causes heavy interference in analog signals. Additionally, normal Patchbays change the impedance of the digital cable route, which causes interference in the digital path. Use the BEHRINGER ULTRAMATCH SRC2000 specifically designed for this and other digital signal-related functions.

Microphone inputs operate at a level several orders of magnitude lower than Line levels (+4 dBu or -10 dBV). Therefore, they should never be routed via a Patchbay. In any case, patching in a field with 48 VDC (Phantom Power) flying about is to be avoided at all costs. It is best to plug mics directly into the mixing console or via special XLR-type wall boxes connected to the Mic inputs of the console by good-quality balanced multicore cables (2-cond. + shield).

4.3.6 Patchbay organization

Let us give you an example configuration that shows how you can most effectively use your Patchbays. We assume you own a mixing console with 16 Mic/Line inputs plus inserts, 8 Direct Outputs, 8 Subgroups with 4 inserts, 4 Aux paths with 2 stereo Returns and one stereo master output including insert jacks. Added to this we have an 8-track recorder (digital or analog), a few pieces of outboard equipment (FX, Dynamics & EQ's), a CD player, tape deck, HiFi system and a headphones amp:

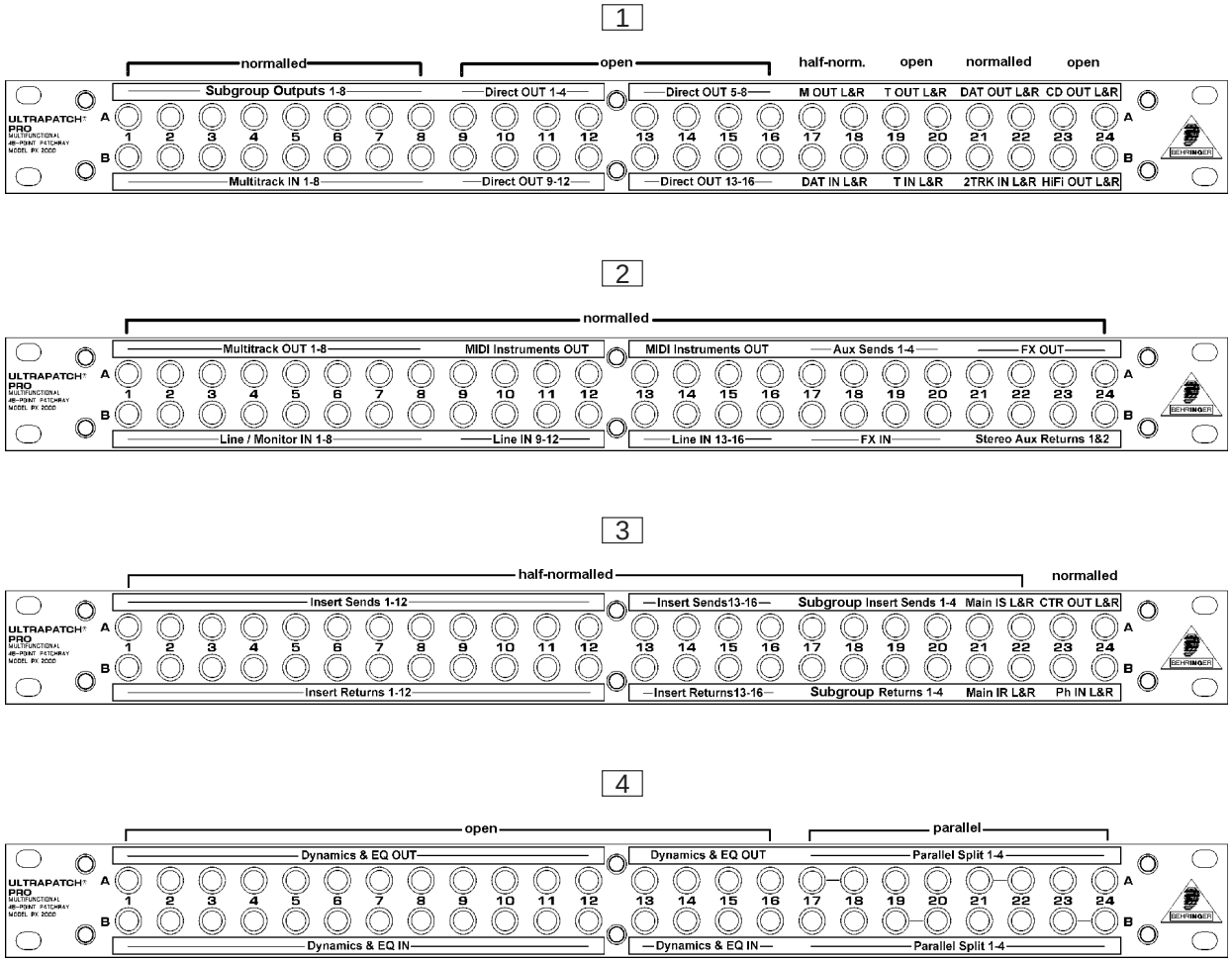

Fig. 4.1: Example of a studio organization with four Patchbays

In the first eight modules of Patchbay 1 the Subgroup outputs are directly connected to the corresponding

multitrack inputs. In addition to that it is also possible to record the signals coming from a Subgroup on a different track of the multitrack. To save space and provide a clearly structured configuration, the Direct Outputs are connected both to the top and bottom jacks. Modules 17 & 18 are the stereo master output, which is half-normalled and thus allows for recording both to the DAT recorder and the tape deck, simply by patching it accordingly. Modules 19 & 20 (tape deck) are open, because it does not make sense connecting the inputs and outputs of the tape deck. 21 & 22 are normalled and route the DAT recorder outputs to the 2-Track-ins of the mixing console. So it always is possible to control the recorded data on the 2-Track from the mixing console. The CD player and the HiFi system are connected to modules 23 & 24, which are open, because they only serve as a source.

In Patchbay 2 the first 16 modules are normalled (1 through 8 IN could also be used to connect the corresponding monitor inputs - if the console has a separate monitor section). MIDI devices such as samplers, expanders, keyboards, etc. are usually set up in every corner of the room. To make the cabling better structured we route these units to modules 9 through 16. This allows further workmanship of the MIDI devices at the mixing console. Modules 17 through 20 are normalled and have the FX inputs and the Aux Sends connected, 21 through 24 are also normalled and are patched to the two stereo Aux Returns with the FX outputs.

In patchbay 3, modules 1 through 16 are for the channel insert. These modules are half-normalled, so that you have an additional route for the channel signals. The same applies to the insert paths of the Subgroups and the master output. The headphones amp is connected to 23 & 24, which are normalled and connected to the Control Room outputs of the mixing console. Of course, you can also use pre-fader Aux paths for the headphones mix.

Patchbay 4 manages the dynamics and frequency-processing devices in an open configuration (modules 1 through 16). Multigates and Compressors should be used here, in particular. Modules 17 through 24 are used to provide a “parallel split”, i.e. two modules are patched to each other on the rear with one patch cord, so that you can split up a signal applied on the front panel to several destinations. These modules have a parallel configuration.

It should be noted that Patchbays should be placed one below the other in such a way that the patch cords won’t hang all over the Patchbays. In our example you don’t have to span great distances, for instance, to patch the Dynamics and EQ’s to the insert paths.

4.3.7 Looming problems

Loom wiring is an art unto itself, and it is worth taking time out to get it right. First off, it is important to avoid earth loops (a looped wire acts an aerial, picking up hum and electromagnetic radiation). Think of a tree. Every part of that tree is connected to every other part, but only by one route. That’s how the total earth picture for your entire studio should look. Don’t take the earth off your power cable plug to reduce audible 50 Hz mains hum. Rather you should be looking at disconnecting the signal screen somewhere (one or several audio cables).

It is good practice to ensure that all screens are commoned at the Patchbay, in which case all unearthed equipment would pick up earth from this point via a single screen (more than one route = an earth loop), while mains-earthed equipment would have all screens cut at the equipment end.

Some quality equipment has an independent signal and mains earth. In this case at least one screen should carry earth to the equipment. Sometimes the only way to find out is “suck and see”.

Take care to ensure that using the Patchbay does not disturb the studio’s earth architecture. Always use short as possible patch leads with the screen connected at both ends.

Having designed mains hum out of the system, make up your cable looms from the Patchbays outwards, and use cable ties, flexible sheaths, multicores, etc. to keep the back of your racks tidy.

4.4 Expanding

When the EURORACK is your main mixer, you may find that you run out of inputs as your system expands. It is possible to expand your mixing system by combining two or more mixers.

Adding extra Line inputs to your EURORACK
A small line mixer (such as the BEHRINGER ULTRALINK PRO MX882 Channel Mixer/Splitter/Signal Router)

can inexpensively add extra line inputs to your console. With the ULTRALINK PRO, any stereo, line-level input on your EURORACK can become a stereo Line input plus a further 6 pan-able mono Line inputs. Great for adding tape monitor returns etc.

Linking two EURORACKs
Simply take the Main Mix output of one, and feed it into a suitable stereo Line input of the second.

Linking the EURORACK to a master console
Feed any or all of the Main Mix, Alt 3-4 and Aux outputs from your EURORACK into separate channels of the master console. The Aux outputs should be routed only to individual Aux Send buses on the master console. Now the Aux Sends from the EURORACK can access effects currently used by the master console.

The EURORACK outputs are essentially submixes of several channels of sound, and are therefore likely to be considerably higher than the typical source signals (coming from mics, MIDI instruments or tape) seen by the remaining channels of the master console or the 2nd EURORACK.

5. TECHNICAL BACKGROUND

5.1 Mixing

5.1.1 Equalization

Few people buying a mixer will need to be told how an Aqualizer works. But how to get the best out of it? Well, that's another story.

In the beginning EQ was an instrument for removing unwanted frequencies, or compensating for imperfect microphone response curves, or bumps in a studio's acoustic. It was a corrective device. Tamla Motown turned that notion upside down in the sixties with the novel idea that you try to find for each instrument a characteristic frequency not shared by the other instruments in the mix. Then you whack up its Gain. This makes individual voices punch through a mix in a slightly unnatural but exciting way.

In general corrective EQ usually involves broadband (slope) contouring, together with narrowband notching of unwanted resonances. The narrower the notch or "Q", the less the total signal will be affected.

Finding bad resonances is made easier by first frequency sweeping in BOOST mode.

"Motown" EQ is achieved by applying boost in a fairly broadband way. The broader the band, the more musical but less instrument-specific the effect. Applying boost over a narrow bandwidth will sound "honky". For sounds which require drastic corrective EQ, it is advisable to have a couple of channels of fully comprehensive Parametric Equalization in your rack. (You can always bounce tracks though the outboard EQ, freeing up the unit for the next task).

Check out the BEHRINGER ULTRA-CURVE PRO DSP8024, a superlative digital stereo Equalizer and much, much more. Or our ULTRA-Q PRO PEQ2200 5-band Constant-Q state-variable analog EQ.

For "Advanced Equalization", EQ might be applied to a signal as follows: First, trim the LF and HF shelves to achieve the required slope or "loudness". Now use a parametric EQ band to boost the most significant frequency for each instrument or tape track. Over all channels, if two or more of these frequencies coincide, then you might have to settle for second best in some cases, if you want to achieve optimum separation in the mix. Really nasty frequencies will need notching out.

A good vocal signal can be enhanced by applying a significant boost in the 12 kHz region or higher, above the nasty sibilance region. This is especially effective if you've got a De-Esser patched post-EQ.

☞ **Use the Lo Cut to tighten up channels in a mix: maybe remove it only for the bass, kick drum, toms, tablas, didgeridoo and other deliberate subsonics (when recording classical music ignore this advice).**

With the LF set to boost, and the Lo Cut switch activated, you have pretty much got a peak response rather than shelving at the bottom. Good for tight but deep bass.

Remember EQ contouring can be done with cut as well as with boost. Cutting away the top and bottom, then pushing up the Gain is equivalent to mid range boost! EQ is not a one way street!

Always re set a channel's input Gain (or external devices' output level) after altering the amount of desk EQ cut or boost applied.

5.1.2 Gain optimization

PFL (Pre-Fader-Listen) is the way to set a desk level. Master Aux Send levels are fixed at Unity Gain. As the mix progresses, more and more channels are likely to be sending to effects via the Aux buses, and it's best to PFL all sends just before setting up for the final mix.

Outboard Reverbs etc. should all be made to work hard. There's no point in having an 85 dB dynamic range if the input meter of your reverb is barely flickering. On the other hand, digital distortion is not one of the nicer noises around. You'll have to rely on your ears to detect digital distortion, since different outboard processors calibrate their meters differently.

If you hear distortion, turn down the input on the FX unit, and turn up the desk's Aux Return input.

99 times out of 100 distortion in the Aux Send > FX > Aux Return loop will come from the FX unit (FX Gain too high), and the same goes for a high noise level (FX Gain too low).

Noisy FX (or synth) Returns can be greatly improved by the addition of single-ended noise reduction between FX output and Aux (or channel) Returns. The BEHRINGER DENOISER SNR2000 is ideally suited for this purpose.

I've found that using analog single-ended noise reduction can help warm the sound of certain digital Reverbs which sound too cold/metallic, and also give that "Echoplex" sound to digital delay decays.

Analog multitrack tape should be driven quite hard, since its dynamic range (without noise reduction) is likely to be 20 to 30 dB worse than other elements in the recording chain. Try to record bright. You can always mix back duller. Brightening up an off-tape signal will bring up the level of tape noise. With digital tape or hard disk you have plenty of dynamic range, and treble pre-emphasis is not often necessary. Just don't let the signal distort!

When mixing or recording, keep the channel fader levels around or below 0 dB. If you do find the faders creeping up or down, apply a suitable offset over all channel faders, and try to control your bad habit in future!

6. INSTALLATION

Your BEHRINGER EURORACK MX1804X was carefully packed in the factory and the packaging was designed to protect the unit from rough handling. Nevertheless, we recommend that you carefully examine the packaging and its contents for any signs of physical damage, which may have occurred in transit.

☞ **If the unit is damaged, please do not return it to us, but notify your dealer and the shipping company immediately, otherwise claims for damage or replacement may not be granted. Shipping claims must be made by the consignee.**

6.1 Rack mounting

Enclosed in the shipping box you will find a rackmount kit. If you want to make your MX1804X a rack mixer, loosen the screws from the side panels and use them to fix the rack ears (note, that there is a left and a right one).

☞ **Be sure that there is enough space around the unit for cooling and please do not place the MX1804X on high temperature devices such as power amplifiers etc. to avoid overheating.**

6.2 Mains connection

The mains connection of the MX1804X is made by using the included power supply unit. It meets all of the international safety certification requirements.

☞ **Please make sure that all units have a proper ground connection. For your own safety, it is advisable not to remove the ground connection within the units or at the supply, or fail to make**

this connection at all.

6.3 Audio connections

You will need a lot of cables for different purposes – see the following figures to make sure you have got the right ones.

Use custom-made RCA cables for the 2-Track in/out traffic (centre post = signal (+ve), sleeve = ground/ screen).

It is possible to connect unbalanced sources to the balanced inputs. Use either mono jacks or connect the ring and sleeve of the jack (or pin 1 with pin 3 with XLR plugs). +48 V DC Phantom Power is also provided, which can be switched on and off with +48 V PHANTOM switch 64.

☞ **Please ensure that only qualified persons install and operate the EURORACK. During installation and operation the user must have sufficient electrical contact to earth. Electrostatic charges might affect the operation of the EURORACK!**

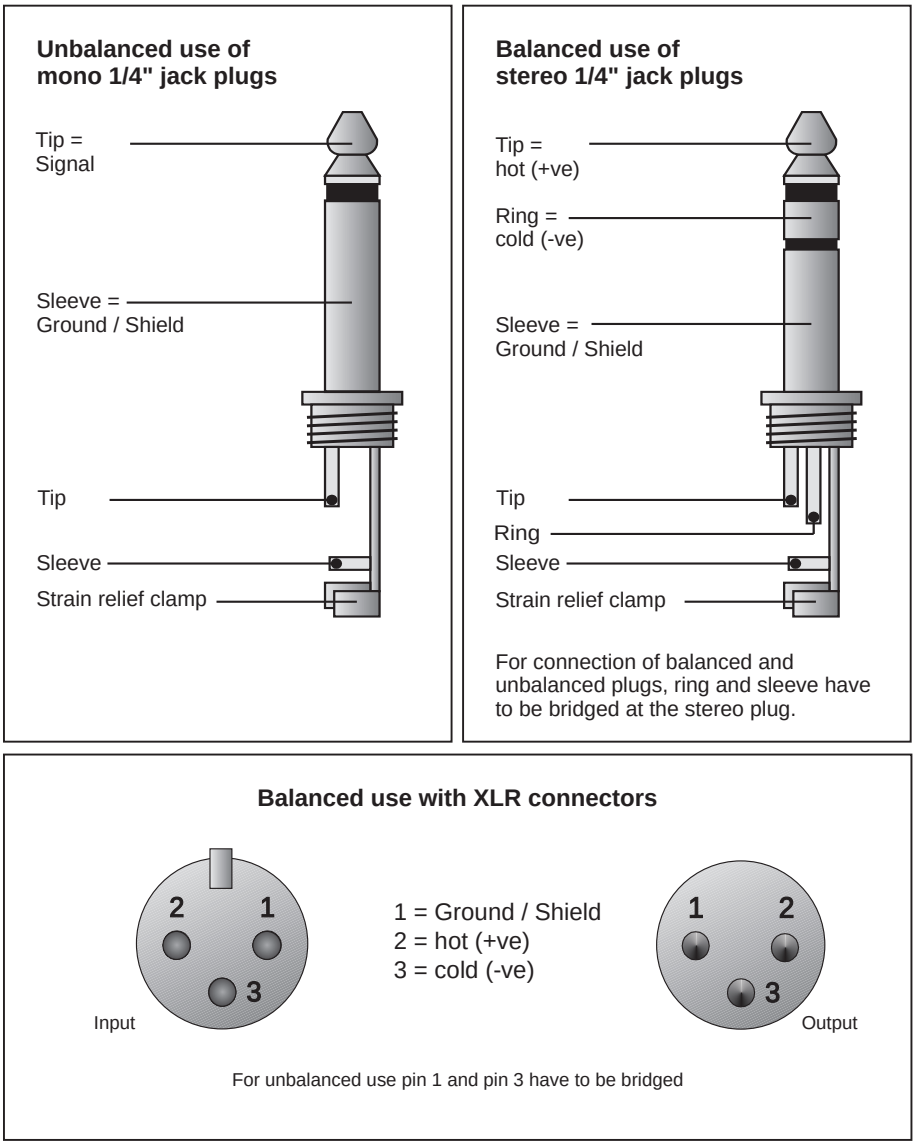

Fig. 6.1: Different plug types

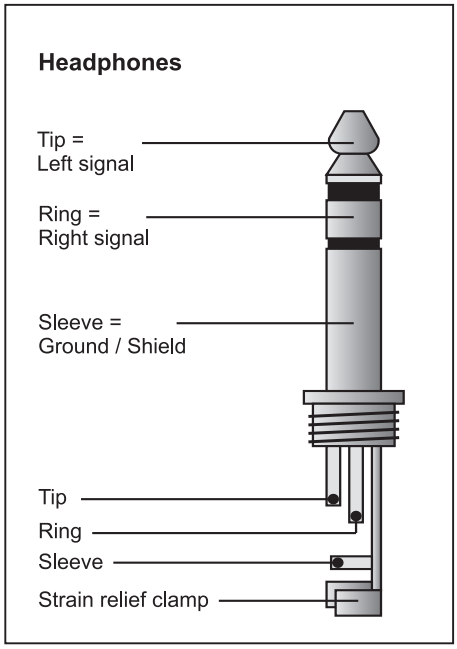

Fig. 6.2: Headphones connector

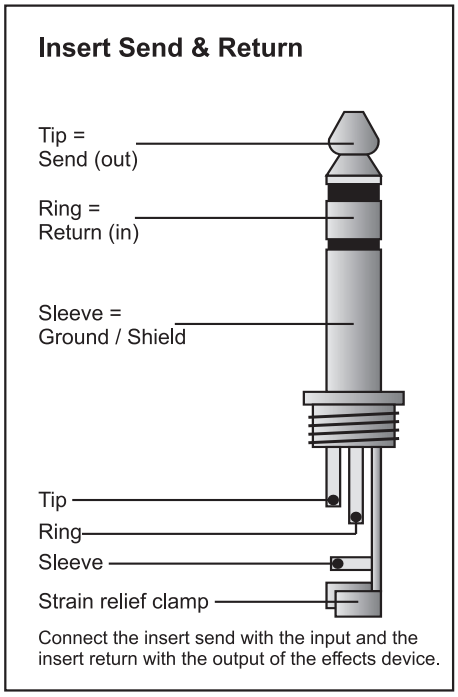

Fig. 6.3: Insert send & return connector

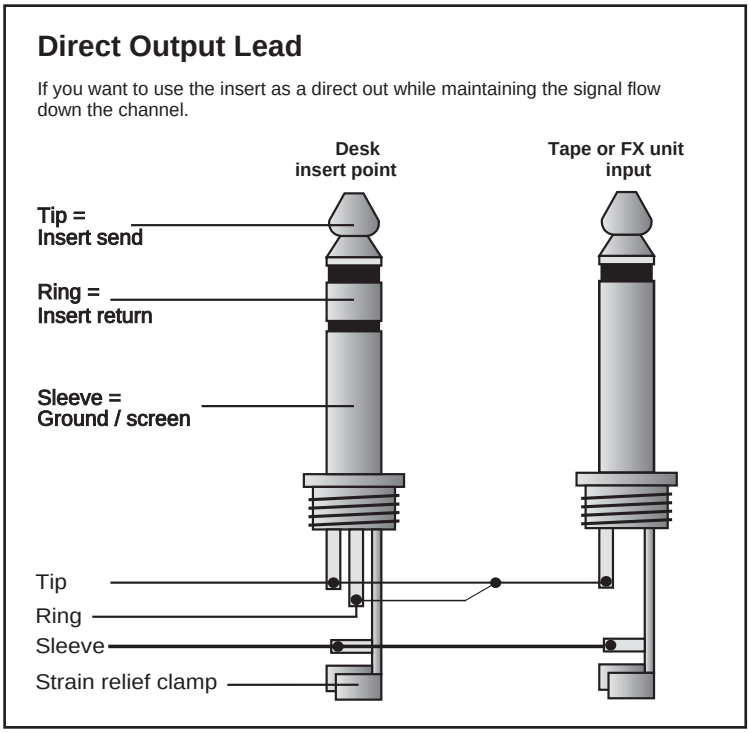
Direct Output Lead
If you want to use the insert as a direct out while maintaining the signal flow down the channel.
Desk insert point
Tape or FX unit input
Tip = Insert send
Ring = Insert return
Sleeve = Ground / screen
Tip
Ring
Sleeve
Strain relief clamp

Fig. 6.4: Direct out

☞ **Care should be taken NOT to plug mics into the console (or stagebox) while the Phantom Power is on. Also, mute the monitor/PA speakers when turning phantom power on or off. Allow the system to adjust for a couple of seconds after engaging phantom power before setting input gains.**

7. APPENDIX

7.1 Front and rear view

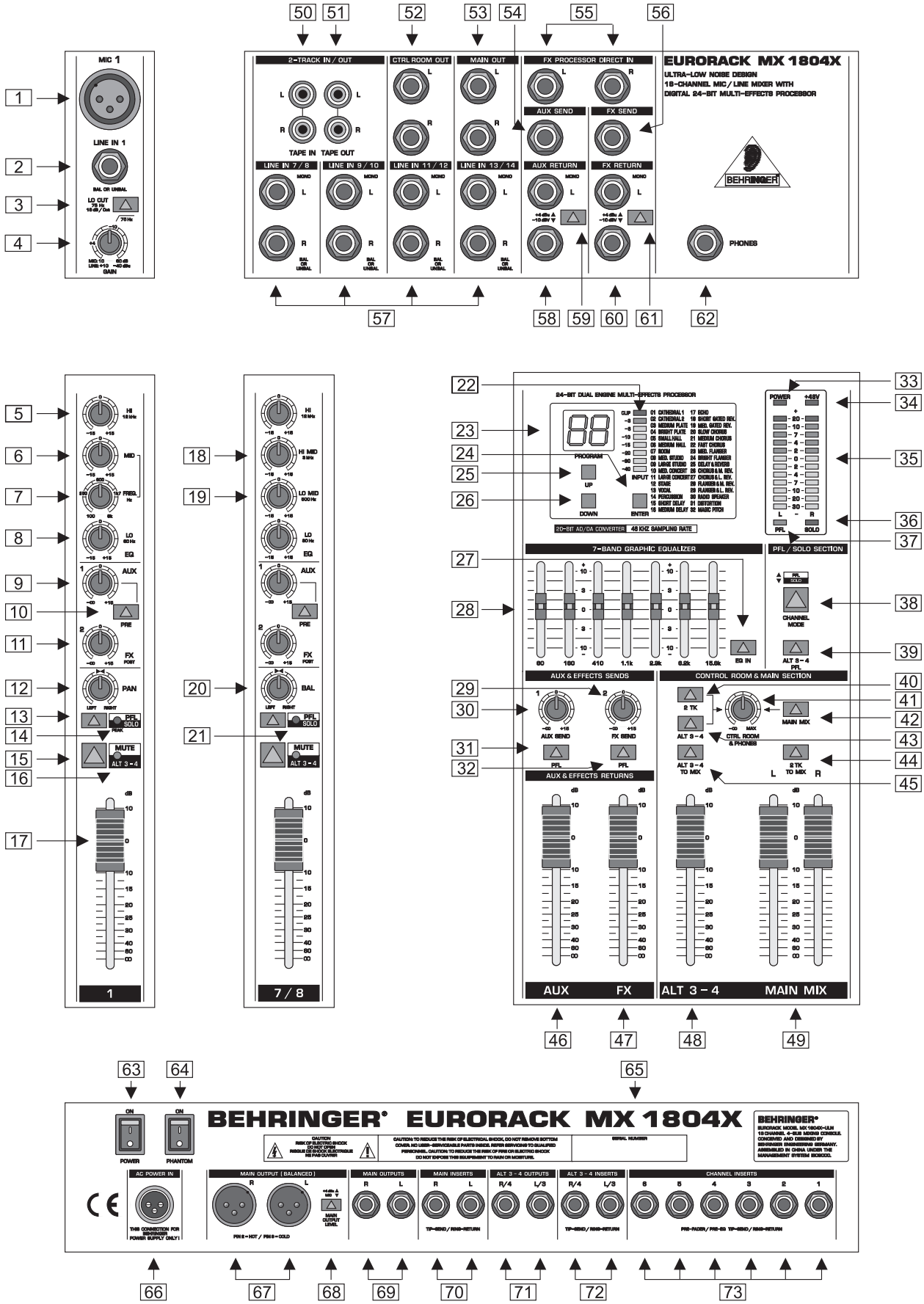

Fig. 7.1: Control elements and connectors of the MX1804X

7.2 Block diagram

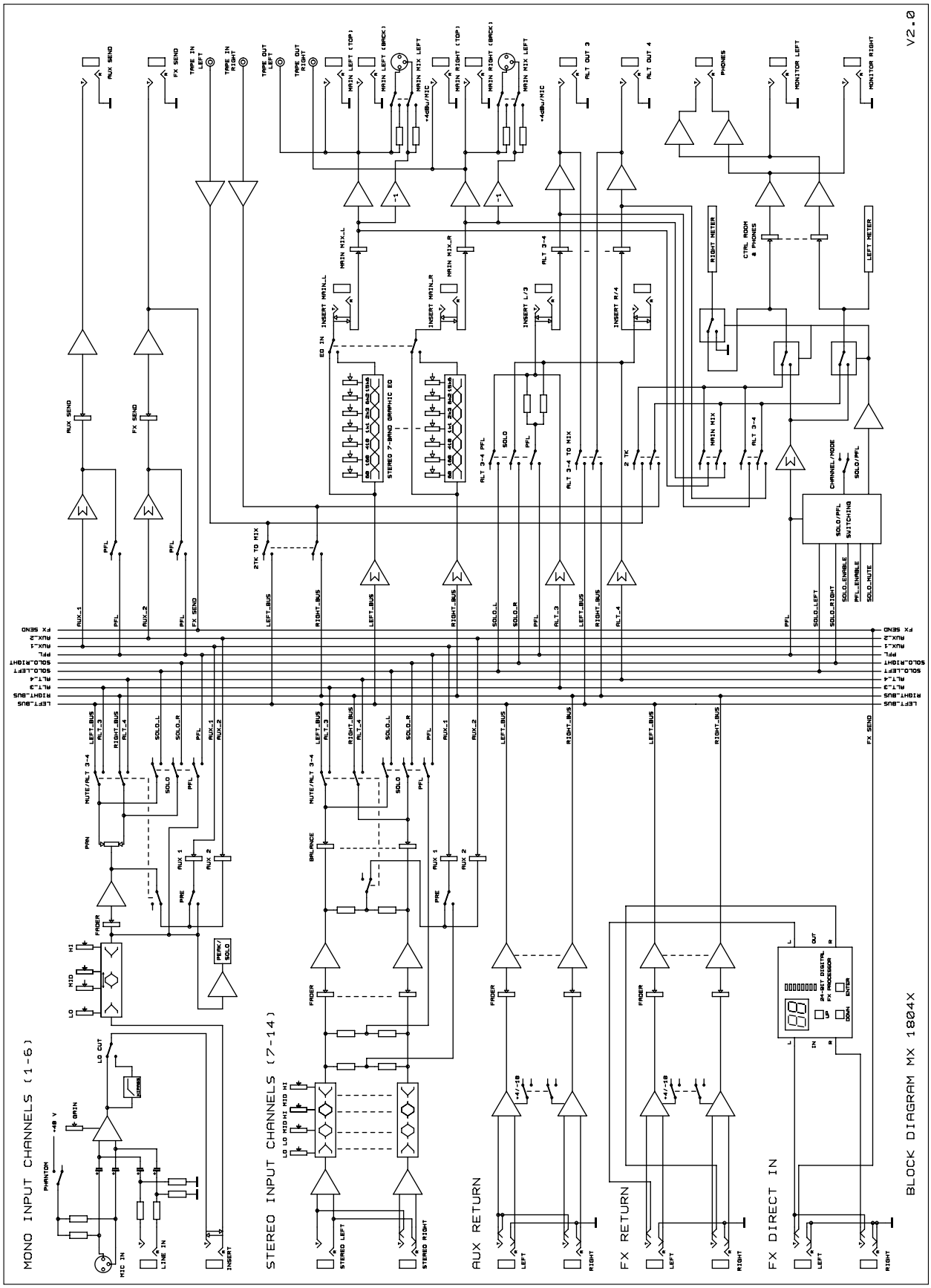

Fig. 7.2: Block diagram of the MX1804X

7.3 Specifications

Mono input channels

Mic input	Electronically balanced, discrete input configuration
Frequency response	10 Hz to 60 kHz +/- 3 dB
Distortion (THD&N)	0.007 % at +4 dBu, 1 kHz, bandwidth 80 kHz
Gain range	+10 dB to +60 dB
Max. input	+12 dBu
Mic E.I.N. (22 Hz - 22 kHz)	-129.5 dBu, 150 Ohm source, -117.3 dBqp, 150 Ohm source, -132.0 dBu, input shorted, -122.0 dBqp, input shorted.
Line input	Electronically balanced
Frequency response	10 Hz to 60 kHz +/- 3 dB
Distortion (THD&N)	0.007 % at +4 dBu, 1 kHz, bandwidth 80 kHz
Channel fader range	+10 dBu to -60 dBu
Max. input	+22 dBu

EQ

Low	80 Hz, +/- 15 dB
Mid	100 Hz to 8 kHz, +/- 15 dB
High	12 kHz, +/- 15 dB
Lo Cut filter	-3 dB at 75 Hz, 18 dB/Okt.

Stereo input channels

Line input	Electronically balanced
Frequency response	10 Hz to 60 kHz +/- 3 dB
Distortion (THD&N)	0.007 % at +4 dBu, 1 kHz, bandwidth 80 kHz
Channel fader range	+10 dBu to -60 dBu
Max. input	+22 dBu

EQ

Low	80 Hz, +/- 15 dB
Lo mid	500 Hz, +/- 15 dB
Hi mid	3 kHz, +/- 15 dB
High	12 kHz, +/- 15 dB

Main Mix

Max. output	+28 dBu balanced on XLR, +22 dBu unbalanced on jack
Aux Send max. output	+22 dBu unbalanced
Control Room output	+22 dBu unbalanced
Noise	-112 dB (all channels open, at unity gain)

Digital Effects Processor

Converter	24-bit sigma-delta, 64/128-times oversampling
Sample rate	46.875 kHz

Graphik Equalizer

Frequencies	60 Hz, 160 Hz, 410 Hz, 1.1 kHz, 2.3 kHz, 6.2 kHz und 15.6 kHz
Max. boost/cut	+/- 10 dB

Power Supply

Mains voltage	U.S.A./Canada	115 V ~, 60 Hz, Power Supply MXUL1
	U.K./Australia	240 V ~, 50 Hz, Power Supply MXUK1
	Europe	230 V ~, 50 Hz, Power Supply MXEU1
	Japan	100 V ~, 60 Hz, Power Supply MXJP1

Dimensions/weight

Dimensions (H * W * D)	approx. 1.58 " / 3.54" (40 / 90 mm) * 16.14" (410 mm) * 15.16" (385 mm)
Weight	6.0 kg (without power supply)

BEHRINGER is constantly striving to maintain the highest professional standards. As a result of these efforts, modifications may be made from time to time to existing products without prior notice. Specifications and appearance may differ from those listed or shown.

7.4 Modifications

The following modifications require you to do some soldering. Attempt only if you are experienced in using an iron on PCBs. Otherwise, refer to qualified personnel.

☞ **After modification the BEHRINGER warranty becomes discretionary.**

Links should not be threaded into holes on the PCB. They should be soldered to the tinned areas around the holes, and bowed slightly upwards in between.

Mono channels: Aux Send 2 > pre-fader

Mono channel Aux Sends 2 are post-fader. If you want to convert them, carry out the modification described below to each mono channel you want to be altered. The right PCB area is indicated by a yellow printing (see figures below).

1) Switch desk off and disconnect it from the mains supply!

2) Cut the “post” track.

3) Add in a “pre” link.

Repeat for all mono channels you want to be modified.

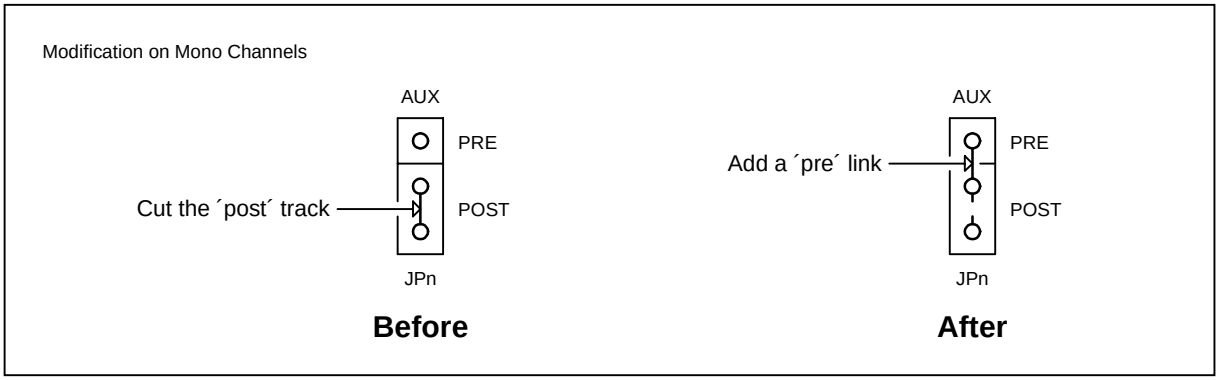

Fig. 7.3: Modifications on mono channels

7.5 Glossary

Ambient Music
atmospheric/lacking in a strong beat (e.g. can be played with a drum track, can be rhythmically gated etc.)
Balance
relative levels of left/right in a stereo pair, usually controlled by a panoramic potentiometer (panpot)
BPM
Beats Per Minute
Channel
input strip on a mixing desk
Clip, Clipping
overload, severe distortion
Compressor
device or program for limiting dynamic range (increasing energy)
Cross fader
fades in one music track while simultaneously fading out another
Cue
headphone feed
Cueing
getting music ready to come in at pre-arranged point
Cut Switch
silences audio

dB (decibel)
a unit of measurement, ratio of two voltages (dB = 20 log (V1/V2)), (dBu = voltage ratio relative to 0.775 V RMS)
DI (Direct Injection)
connecting an electric instrument directly to the console via a DI-Box, converting the high level unbalanced signal (from the instrument) into a low level balanced signal (for the console)
DJing
sequencing music tracks e.g. for dancing audience
Drum machine
electronic drum instrument
Echo
device or program for adding repeats
Effects (abbr. FX or EFX)
devices that alter the original ('dry') sound or add something to it, e.g. delay
Equalizing
the use of filters for cutting or boosting selected frequencies
Exciter/Enhancer
device or program for improving treble and bass intelligibility
Expander
(see Noise Gate)
Fader
linear potentiometer with logarithmic response
Feedback (howlround)
unstable circuit (e.g. mic/speaker, input/output) where a signal is able to return to an input from an output, causing successive cycles of progressively higher gain (avoid it by e.g. not using a mic close to a speaker driven from the mic's own signal)
Filter
device or program for adding or removing removing part of frequency bandwidth e.g. for dramatic effect
Flanger/Chorus
device or program for adding short modulated echoes
Gain
degree of amplification
Headroom
signal range between nominal level and clipping
Incoming (cue) track
music being auditioned prior to being played
Kill Switches
switches for removing frequency bands
Limiter
(see Compressor)
Line level signals
signals from low impedance sources (-10 to +6 dBu)
Lo(w) Cut (= High Pass) Filter
cuts off low frequencies
MCing
adding dialog to a sequence of music
MIDI
Musical Instrument Digital Interface - the language used by 99% of all electronic musical devices and programs
Mixdown
process by which a multitrack recording is combined into e.g. one or two channels
Mixing
seguing music to form continuous flow
Mute
(to engage) button for signal muting
Mute Switch
(see Cut Switch)
Noise Gate
device or program for auto-muting

Normal
connect an output to an input via breakable link
Outgoing (mix) track
music currently playing
Parametric EQ
EQ whose frequency can be swept e.g. for dramatic effect
PFL
Pre-Fader-Listen
Phantom Power
+48 V DC voltage for powering condenser mics
Phase coherence
degree to which L & R signal are synchronized
Phase correlation
degree of mono compatibility of L & R signal
Pot or potentiometer
a variable, usually rotary voltage driver used e.g. for gain, frequency, quality or bandwidth control
Rapping
adding dialog to a rhythmic track
Recorder
device or program for recording and playing back sounds (e.g. tape, hard disk)
Regeneration
(see Feedback)
Resonance
fast feedback
Reverb
device or program for adding reverb
Route
signal path
RPM
Revolutions Per Minute
Sampler
device for digitally storing and playing back sound
Scratching
manually spinning vinyl discs e.g. backwards and forwards
Sequencer
device or program for recording and playing back compositions (see MIDI)
Slipmat
Fabric turntable mat which enables turntable to spin while DJ holds record stationary. Let go record for a fast start. Gets over problems of slow turntable start.
Solo
solo in place, stereo image retained
Source
signal source
Spatial Enhancer
psychoacoustic device or program for making stereo seem to come from beyond the area between the loudspeakers
Synthesizer
electronic musical instrument
Tempo
(see BPM)
Transforming
chopping up a music signal by using mutes or gates etc.
Transient
a transitory (extreme) rise in signal level
Trimpot
variable gain potentiometer
Varispeed
control for varying playback speed
Wet signal
mix signal with effects added

8. WARRANTY

§ 1 WARRANTY CARD/ONLINE REGISTRATION

To be protected by the extended warranty, the buyer must complete and return the enclosed warranty card within 14 days of the date of purchase to BEHRINGER Spezielle Studiotechnik GmbH, in accordance with the conditions stipulated in § 3. Failure to return the card in due time (date as per postmark) will void any extended warranty claims.

Based on the conditions herein, the buyer may also choose to use the online registration option via the Internet (www.behringer.com or www.behringer.de).

§ 2 WARRANTY

1. BEHRINGER (BEHRINGER Spezielle Studiotechnik GmbH including all BEHRINGER subsidiaries listed on the enclosed page, except BEHRINGER Japan) warrants the mechanical and electronic components of this product to be free of defects in material and workmanship for a period of one (1) year from the original date of purchase, in accordance with the warranty regulations described below. If the product shows any defects within the specified warranty period that are not due to normal wear and tear and/or improper handling by the user, BEHRINGER shall, at its sole discretion, either repair or replace the product.

2. If the warranty claim proves to be justified, the product will be returned to the user freight prepaid.

3. Warranty claims other than those indicated above are expressly excluded.

§ 3 RETURN AUTHORIZATION NUMBER

1. To obtain warranty service, the buyer (or his authorized dealer) must call BEHRINGER (see enclosed list) during normal business hours **BEFORE** returning the product. All inquiries must be accompanied by a description of the problem. BEHRINGER will then issue a return authorization number.

2. Subsequently, the product must be returned in its original shipping carton, together with the return authorization number to the address indicated by BEHRINGER.

3. Shipments without freight prepaid will not be accepted.

§ 4 WARRANTY REGULATIONS

1. Warranty services will be furnished only if the product is accompanied by a copy of the original retail dealer's invoice. Any product deemed eligible for repair or replacement by BEHRINGER under the terms of this warranty will be repaired or replaced within 30 days of receipt of the product at BEHRINGER.

2. If the product needs to be modified or adapted in order to comply with applicable technical or safety standards on a national or local level, in any country which is not the country for which the product was originally developed and manufactured, this modification/adaptation shall not be considered a defect in materials or workmanship. The warranty does not cover any such modification/adaptation, irrespective of whether it was carried out properly or not. Under the terms of this warranty, BEHRINGER shall not be held responsible for any cost resulting from such a modification/adaptation.

3. Free inspections and maintenance/repair work are expressly excluded from this warranty, in particular, if caused by improper handling of the product by the user.

This also applies to defects caused by normal wear and tear, in particular, of faders, potentiometers, keys/buttons and similar parts.

4. Damages/defects caused by the following conditions are not covered by this warranty:

- misuse, neglect or failure to operate the unit in compliance with the instructions given in BEHRINGER user or service manuals.
- connection or operation of the unit in any way that does not comply with the technical or safety regulations applicable in the country where the product is used.
- damages/defects caused by force majeure or any other condition that is beyond the control of BEHRINGER.

5. Any repair or opening of the unit carried out by unauthorized personnel (user included) will void the warranty.

6. If an inspection of the product by BEHRINGER shows that the defect in question is not covered by the warranty, the inspection costs are payable by the customer.

7. Products which do not meet the terms of this warranty will be repaired exclusively at the buyer's expense. BEHRINGER will inform the buyer of any such circumstance. If the buyer fails to submit a written repair order within 6 weeks after notification, BEHRINGER will return the unit C.O.D. with a separate invoice for freight and packing. Such costs will also be invoiced separately when the buyer has sent in a written repair order.

§ 5 WARRANTY TRANSFERABILITY

This warranty is extended exclusively to the original buyer (customer of retail dealer) and is not transferable to anyone who may subsequently purchase this product. No other person (retail dealer, etc.) shall be entitled to give any warranty promise on behalf of BEHRINGER.

§ 6 CLAIM FOR DAMAGES

Failure of BEHRINGER to provide proper warranty service shall not entitle the buyer to claim (consequential) damages. In no event shall the liability of BEHRINGER exceed the invoiced value of the product.

§ 7 OTHER WARRANTY RIGHTS AND NATIONAL LAW

1. This warranty does not exclude or limit the buyer's statutory rights provided by national law, in particular, any such rights against the seller that arise from a legally effective purchase contract.

2. The warranty regulations mentioned herein are applicable unless they constitute an infringement of national warranty law.

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